

Appendix B: Summary of RGD Radiation Safety Requirements

RGD Compliance Item	Further Explanation	Class			
		I	II	III	IV
RGD Charact/Rad. Safety Eval.	Initially and upon change	X	X	X	X
Inventory - unique RGD #; Class I, II: yearly; Class III, IV: every 6 months	A verbal inventory may be substituted for Class I devices	X	X	X	X
I. Posting					
Notice. Access Control	On entrances to building or area		X	X	X
Caution. X-Ray Area	On doors entering rooms with RGDs		X	X	X
Caution or Danger. Radiation, High, or Very High Radiation Area	Prior to entering radiation field		X	X	X
Caution. RGD Approved Operating Parameters	On control console	X	X	X	X
Class I RGD Guidance Posting	One-page guidance posting near device	X			
Caution. RGD	On tube housing, if applicable		X	X	X
Last Survey Date/Next Due sticker	On control console	X	X	X	X
II. Interlocks, Warning Indicators					
Interlocks					
Key controlled when not in use	Exceptions documented in safety procedure	X	X	X	X
Interlocks, if present are operational		X	X	X	X
Enclosures of fail-safe design			X	X	X
Flash x-ray interlocked during charging	To prevent entry during charging		X	X	
Emergency shutdown switch	Enclosures that can be occupied			(X)	X
Written interlock test procedures			X	X	X
Interlock bypass operations in SP			X	X	X
Master key required to access exclusion areas					X
Redundant interlocks on access doors to exclusion areas					X
Hazard-safe switches at entrances/exclusion areas					X
Key-lock watchman stations or Run-Safe Boxes within the exclusion area					X
Manual reset requirements for interlocks					X
Warning Indicators-Lights					
If warning lights are installed, do not modify		X			
Fail-safe warning lights near source	On, when x-rays are generated or when the machine is being charged. Optional for e-beam RGDs		X	X	(X)
"X-Ray On" or charging status light	Located near console		X	X	
"Shutter Open" lights near shutter	"Shutter Open" lights should be present		X	X	
Lights dimmed prior to operation	In large exclusion areas				(X)
Rotating magenta lights	At entrances to "High Radiation Areas" or "Very High Radiation Areas" during operation		(X)	(X)	X

X denotes "applicable"; **(X)** denotes "as applicable"

RGD Compliance Item	Description	Class			
		I	II	III	IV
Warning Indicators-Announcements					
Voice announcement to vacate	Audible in large exclusion areas				X
Warning Indicators-Alarms					
X-ray monitor or safety box, or equivalent fixed detector	Adjacent to port if it will enhance safety		(X)	X	
RAM system with remote readout	Visible and audible alarms				(X)
Alarms sounds with radiation generation/evacuation	Chimes/high-pitched chimes				X
III. Shielding & Rad. Safety Survey					
Shielding					
Enclosed Beam Operations					
Dose rate < 0.5 mrem/h at 5 cm	Or a dose rate <100 mrem/y	X			
Dose rate < 0.5 mrem/h at 30 cm			X	X	
Shielding designed to limit dose in occupied areas to < 0.5 rem/y			X	X	X
Beams >0.1 R/h fully enclosed, if feasible			X	X	X
Beam ports covered when not in use			X	X	
Open Beam Operations					
Visible posted barrier at 5 mrem/h, 100 mrem/h, and >500 rads/hr	2 mrem/hr boundary established in accessible areas		X	X	X
Constant surveillance and no operator within visible barrier			X	X	X
Radiation Safety Survey					
“Not Operational” devices, Class I, II: yearly; Class III, IV: every 6 months	Class I devices annual radiation safety surveys may be reduced to a verbal inventory	(X)	X	X	X
IV. Documentation					
RGD logbook	Characterization, surveys, interlock test, and maintenance log. Use log for Class IV devices	(X)	X	X	X
Safety procedure (OSP or FSP)	Bypass operations & all Class II, III , and IV devices		X	X	X
LLNL Implementation for DOE 5480.25	Accelerators, as defined by this supplement only				X
V. Training					
RGD Guidance Posting at device		X			
HS6070 or HS6071, or equivalent			X	X	(X)
HS6911					X
VI. Other Requirements					
Dosimetry					
Whole Body Dosimetry	Neutron dosimetry as required by HP	X	X	X	X
Extremity Dosimetry	As required by the health physicist		(X)	(X)	(X)
Supplemental Dosimeters	Access to “High Radiation Areas”		(X)	(X)	(X)
Portable Survey Meter	Available at work location and entrances to exclusion areas		X	X	X

